## Theoretical processing gain and Jammer to Signal ratios (11 Mbps DSSS radio).

| Data rate (Mbps) | Modulation type | Symbol rate (SyR) Symbols/second (Msps) | Spread rate (SpR) Chips/symbol (Mcps) | Processing gain Gp=10log(Spr/Syr) | (S/N)o + Lsys (dB) | Calculated J/S (dB) | Allowed J/S for 10 dB PG, 10dB - (S/N)o + Lsys (dB) |
|---|---|---|---|---|---|---|---|
| 2 | DBPSK | 1 | 11 | 10.4 | 21.3 | -10.9 | -11.3 |
| 11 | CCK | 1.375 | 8 | 7.6 | 19.0 | -11.4 | -9.0 |

All data as stated above has been provided by Intersil and the datasheet of the HFA3861A DSSS baseband processor.
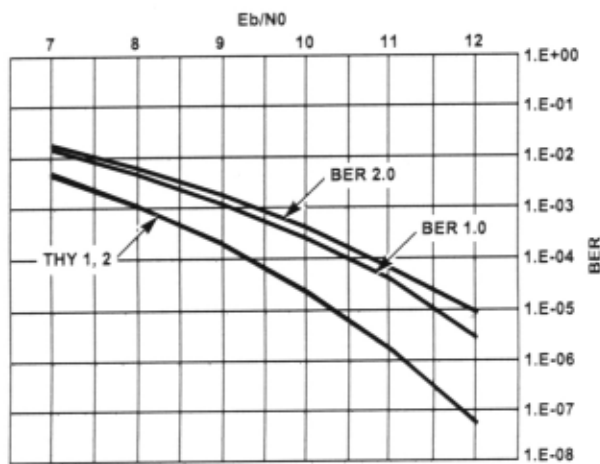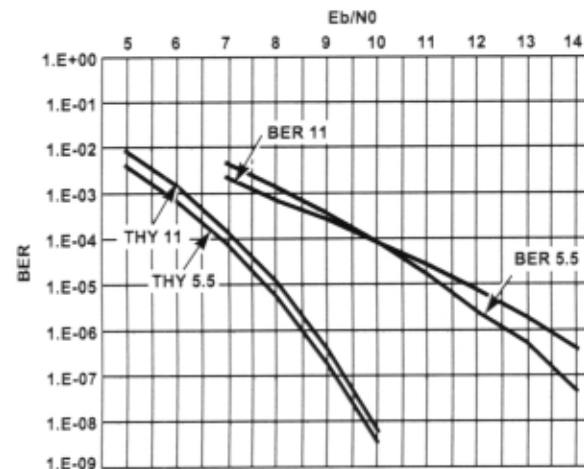


Figure 1 - Copy of datasheet

<u>Explanation of theoretical processing gain calculations.</u>

**BER = 1.E-5, Data rate = 2 Mbps**

$G_p = 10\log(S_{pr}/S_{yr}) = 10\log(11/1) = 10.4$

$E_b/N_0 = 10.3$ dB (from figure 1, copy of datasheet of DSSS baseband processor)

$(S/N)_o = E_s/N_0 = E_b/N_0 +$ correction factor for 8 bits/symbol = 10.3 dB + 10log(8) dB = 10.3 dB + 9 dB = 19.3 dB

$L_{sys} = 2$ dB max.

$G_p = (S/N)_o + M_j + L_{sys}$

Calculated $M_j = J/S = G_p - (S/N)_o - L_{sys} = 10.4$ dB - 19.3 dB - 2 dB = -10.9 dB

Allowed J/S for 10 dB PG = $G_p - (S/N)_o - L_{sys}$ = 10 dB - $(S/N)_o - L_{sys}$ = 10 dB - 19.3 dB - 2 dB = -11.3 dB


**BER = 1.E-5, Data rate = 11 Mbps**

$G_p = 10\log(S_{pr}/S_{yr}) = 10\log(8/1.375) = 7.6$

$E_b/N_0 = 8$ dB (from figure 1, copy of datasheet of DSSS baseband processor)

$(S/N)_o = E_s/N_0 = E_b/N_0 +$ correction factor for 8 bits/symbol = 8 dB + 10log(8) dB = 8 dB + 9 dB = 17 dB

$L_{sys} = 2$ dB max.

$G_p = (S/N)_o + M_j + L_{sys}$

Calculated $M_j = J/S = G_p - (S/N)_o - L_{sys} = 7.6$ dB - 17 dB - 2 dB = -11.4 dB

Allowed J/S for 10 dB PG = $G_p - (S/N)_o - L_{sys}$ = 10 dB - $(S/N)_o - L_{sys}$ = 10 dB - 17 dB - 2 dB = -9 dB